



Solar Deployment Systems Model (SolarDS)

Modeling Solar Energy Use 6th RE Modeling Series

Walter Short
Paul Denholm
Nate Blair

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Purpose of SolarDS

- Analyze the market penetration of photovoltaics (PV) on buildings in the U.S. under different policies and rate structures
- Capture the correlation between PV output and building loads in assessing the economic value and market penetration of PV
- Consider the competition with other distributed generation technologies from the building owner's perspective

Status of SolarDS

- Alpha version should be completed this month

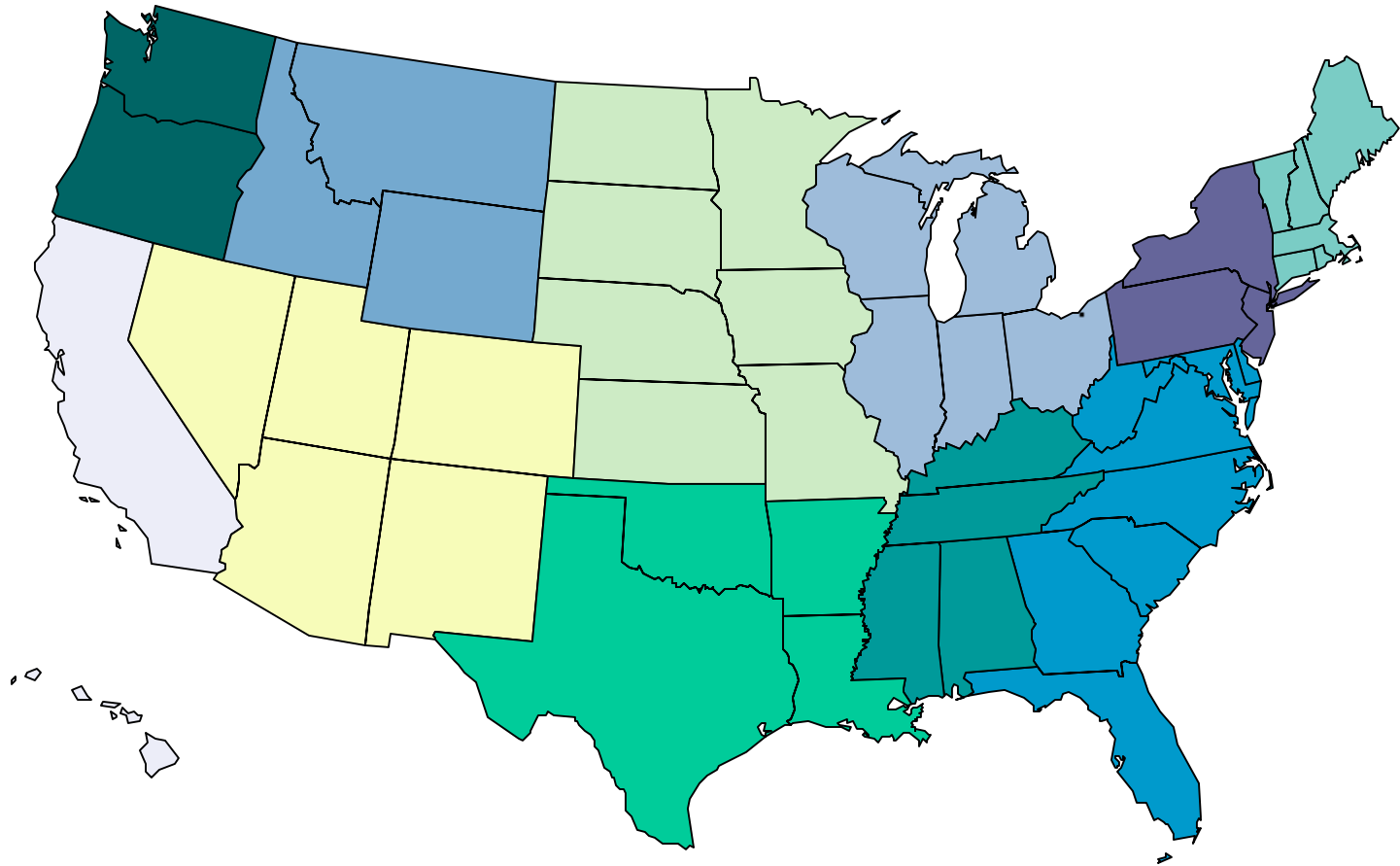
Key Features of SolarDS

- 2005 - 2050 in 5 year increments
- 11 regions (Contiguous Census regions + 2)
- 9 building types with variations on each type (45 total)
- Investment decision from building owner perspective
- 7 technologies – grid only, battery only, PV, cogen
- Optimizes system size
- Each building type in each region characterized by 8760 electric/thermal loads and insolation

Key Features of SolarDS (Cont'd)

- Allows 4 types of rate structures – flat, TOD, demand charge, tiered
- Calculates Net Present Cost of each technology/size option in each bldg type, each region, each period under specified rate structure.
- Distinguishes new vs. retrofit based on costs and financing
- Includes monetized values for reliability, environment, and risk
- Calculates market share using a price-based logit
- Tracks building and DG technology stock

SolarDS Regions



Building Types

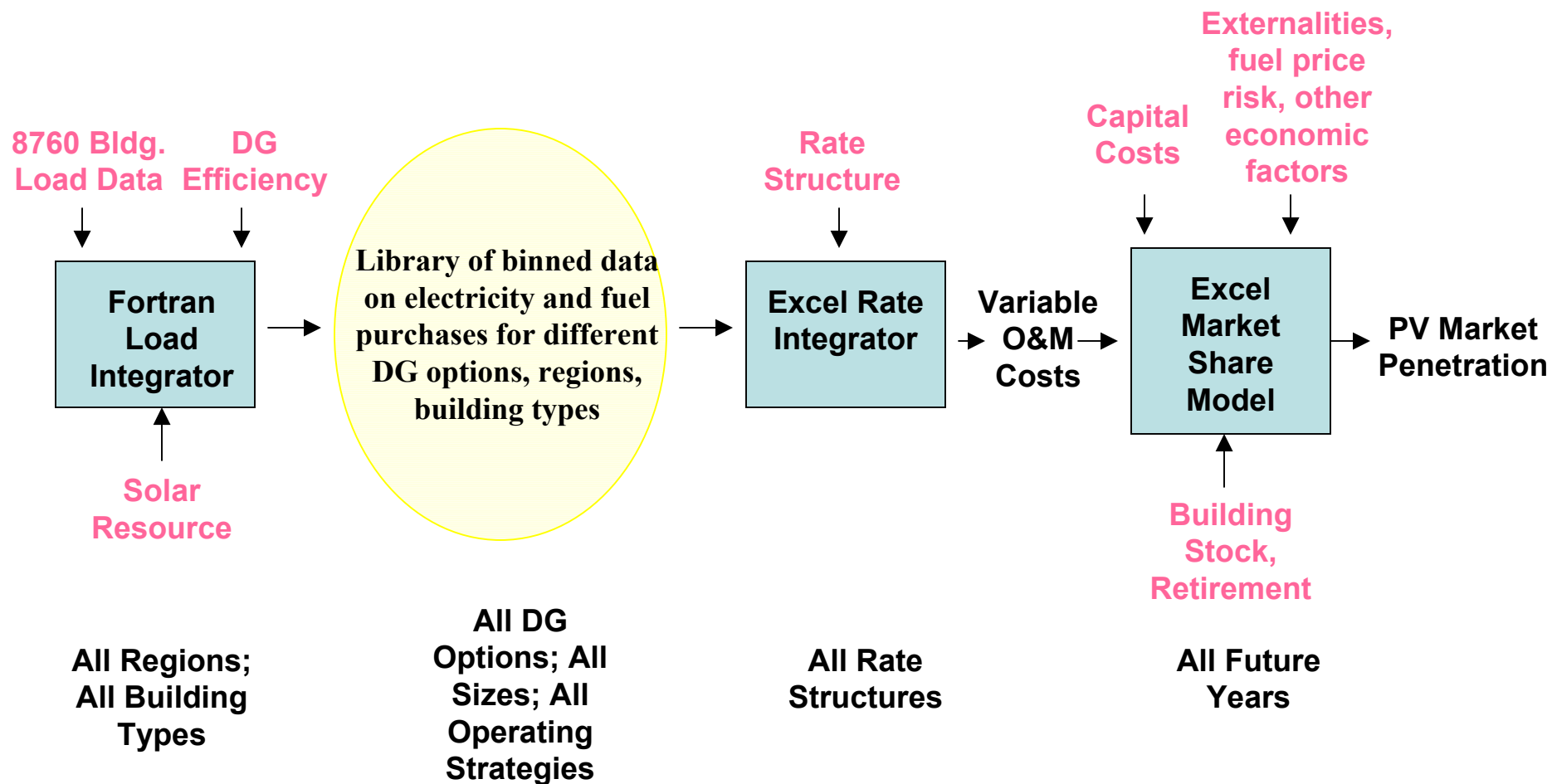
- Residential
 - Single Family Homes
 - Apartment Buildings
- Commercial
 - Restaurant (2)
 - Supermarket
 - Retail
 - Hotel (2)
 - Prison
 - School
 - Hospital

Buildings vary by size, occupancy, shell characteristics, equipment characteristics

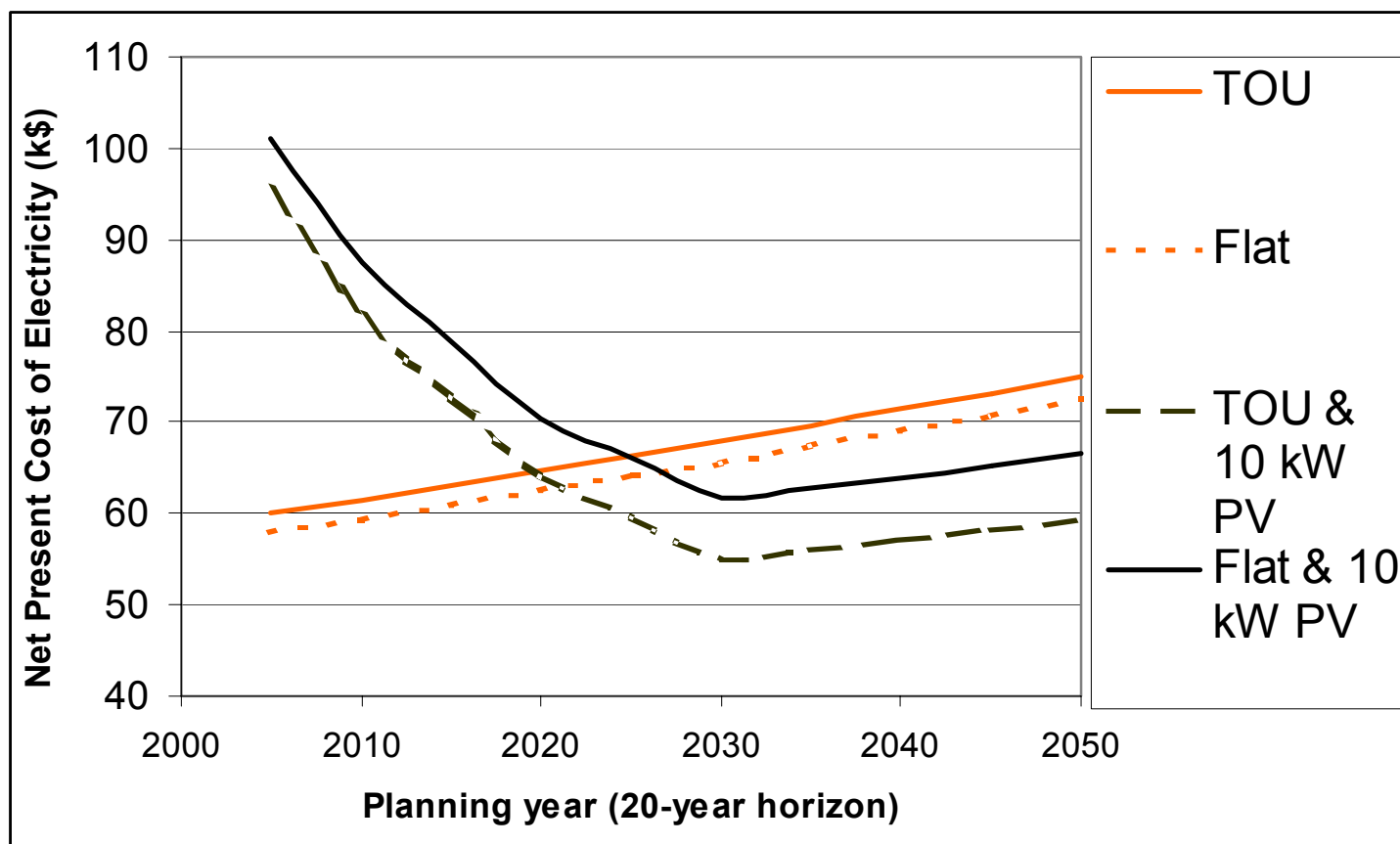
Data Inputs

- **DOE-2 load data** by building type and region developed by LBNL
- **EIA Building Stock** data
- **EERE technology characterizations**
- **EIA AEO fuel and electricity prices**

SolarDS Configuration



Sample Results: NPC of Electricity



Building Type: Small Apartment (~25 kW peak) - San Diego, CA

Annual real electricity price increase of 0.5% with quasi-net metering (sell at 90%)

No price risk or environmental factors.

Challenges

- Rate Structures
 - Key to economic viability of PV
 - Will they have the same structure in the future?
- Load data
 - Need corresponding insolation data
 - Prefer empirical data
 - Prefer consistency across buildings/regions
 - Prefer a larger set of buildings/regions